The NOAA Hydrometeorological Testbed and the
NWS Office of Hydrologic Development

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OHD efforts related to the NOAA HMT:

- Distributed Hydrologic Modeling
- Snowpack Modeling
- Precipitation Estimation
  - Multisensor analysis
  - Remote sensing
  - Rain gauge observation quality control
- Surface Radiation Budgets
- Soil Moisture Estimation
- Data assimilation
- Combined River/Estuary Modeling
- Ensemble and Probabilistic Streamflow prediction

DMIP 2 and HMT

- An exciting linkage providing:
  - Multi-institutional evaluation of HMT data products in an end-to-end test
  - Advanced data products for evaluating important science questions for RFC river forecasting
    - soil moisture
    - precipitation
    - streamflow

Distributed Model Intercomparison Project (DMIP) } Phase 2 Scope

Nevada

American River

Carson River

ETL HMT

California

Kansas

Missouri

Elk River

Illinois River

Oklahoma

Arkansas

Blue River

Texas

Tests with Complex Hydrology

1. Snow, Rain/snow events
2. Soil Moisture
3. Lumped vs. Distributed

Additional Tests in DMIP 1 Basins

1. Routing
2. Soil Moisture
3. Lumped vs. Distributed

Precipitation Analysis and Assimilation

- The California/Nevada observational testbed will provide valuable ground-truth observations for comparison with operational remote sensing systems

- The impact of improved, high-resolution radar and gauge observations on modeling and prediction of streamflow will be assessed
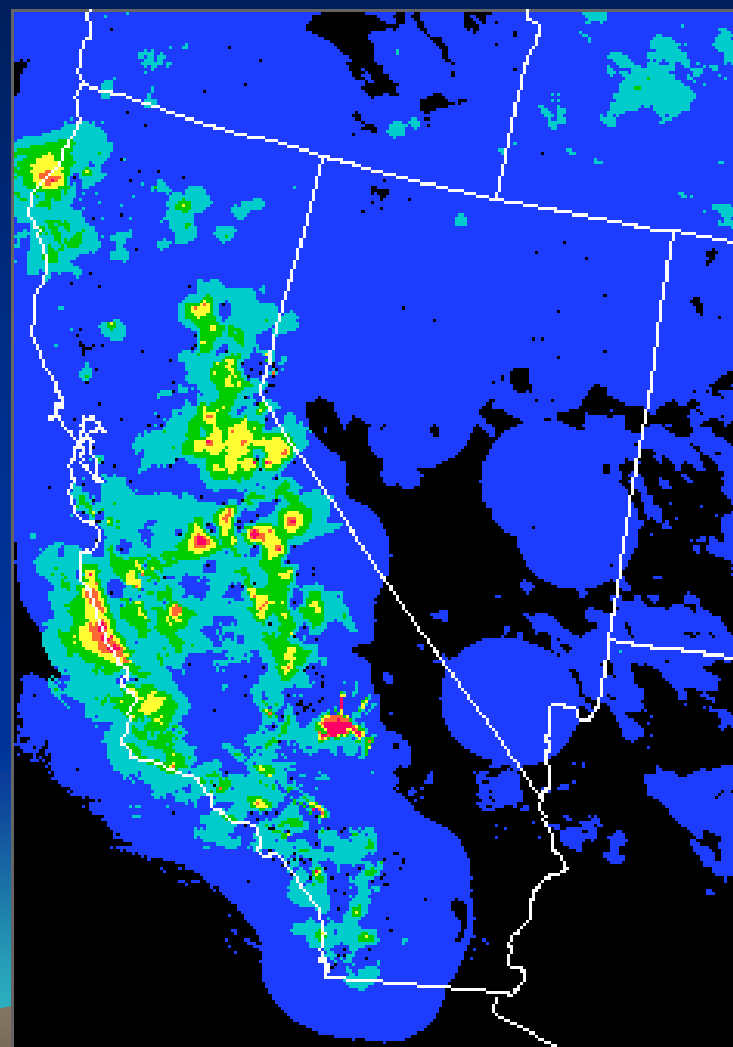
- Methods for automated quality control will be tested

CNRFC 24-Hour Precipitation 17 Dec 2002

Gauge Only
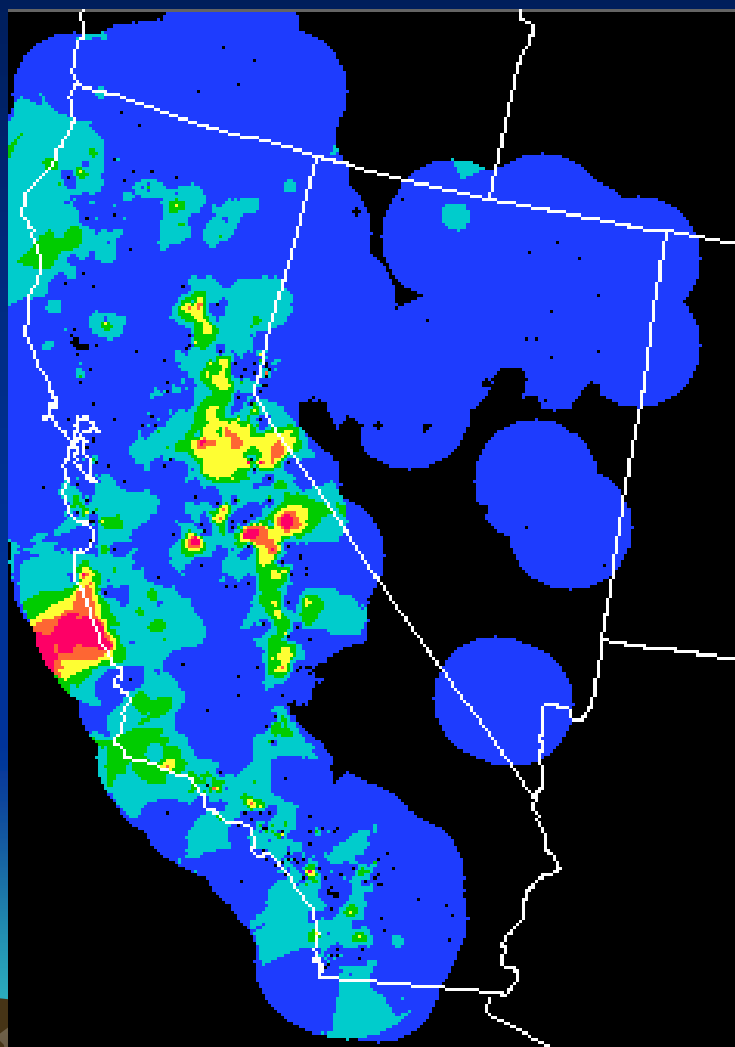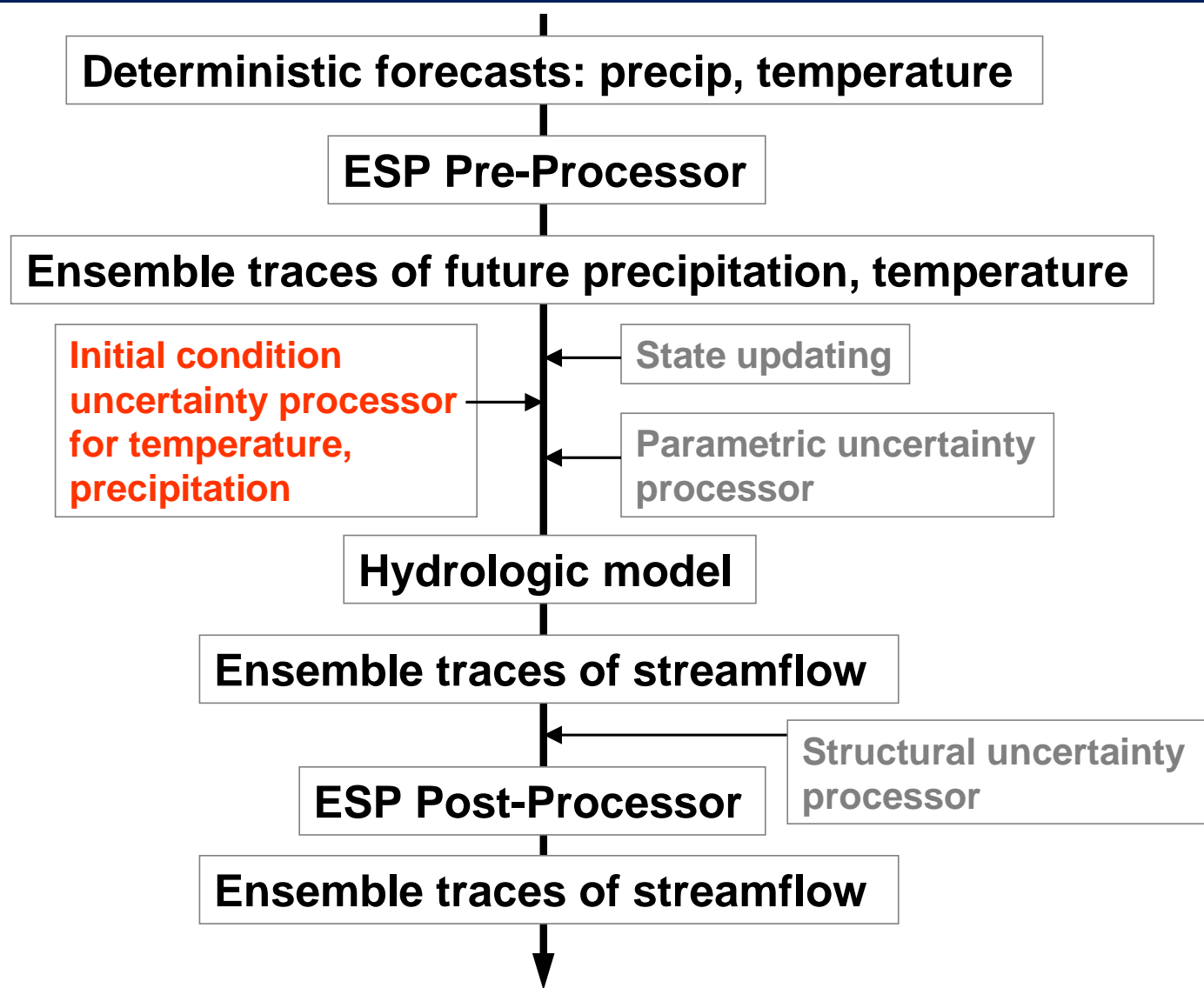
Gauge-Radar-Hydroestimator

Ensemble Streamflow Prediction

- Ensemble streamflow prediction requires knowledge of statistical properties related to spatial distribution of temperature and precipitation

- High-resolution observations from HMT could provide valuable information on small-scale variability in this meteorological forcing

Future Ensemble Streamflow Prediction System with Data Assimilation and Explicit Uncertainty Processors

Deterministic forecasts: precip, temperature

ESP Pre-Processor

Ensemble traces of future precipitation, temperature

Initial condition uncertainty processor for temperature, precipitation

State updating

Parametric uncertainty processor

Hydrologic model

Ensemble traces of streamflow

Structural uncertainty processor

ESP Post-Processor

Ensemble traces of streamflow

Modeling of the Tar Basin River-Estuary System

- Ongoing effort to estimate precipitation, runoff, river channel flow, and river-estuary interactions in the Tar River Basin of North Carolina

- Joint effort among NSSL, NCSU, NOAA NWS

- Major goals are refinement of multisensor precipitation algorithms, river channel model, estuary model

- Experiments will benefit from intensive observations in the testbed area; models can provide validation of observations
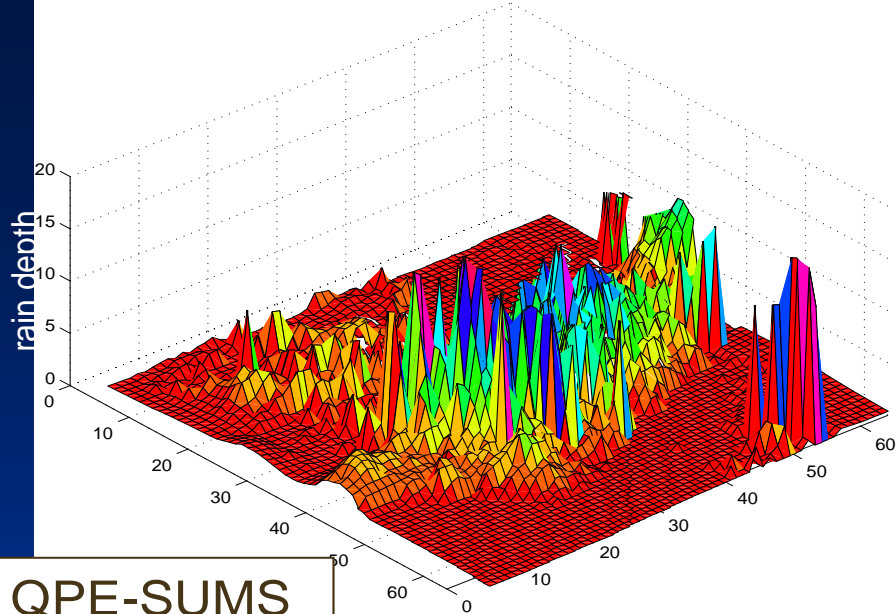
QPE-SUMS
Rainfall Data

Rocky
Mount

Tarbor
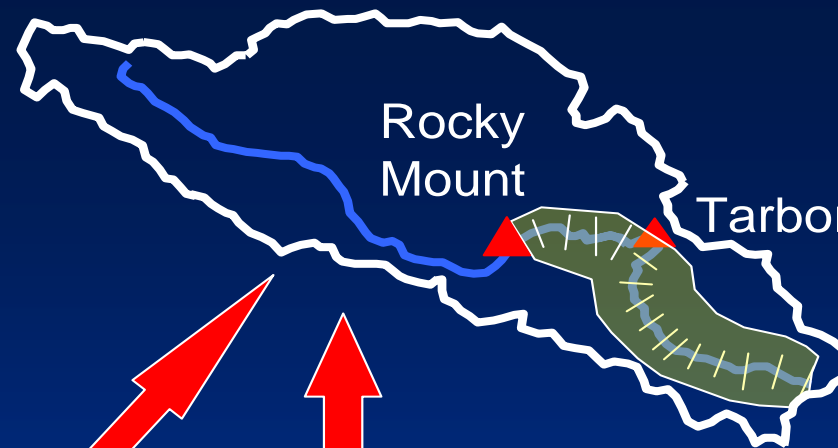
Channel Routing
and
Flood Mapping
Of Tar River belo
Rocky Mount

Tarboro

Distributed
Model of Tar
River Basin

Estuary Mo

Summary

- OHD has carried out extensive intercomparisons of hydrologic models, precipitation estimation systems, and remote sensing systems

- Inhouse expertise will be devoted to evaluation of observations from HMT systems

Estimates of Freezing Level Height and Surface Precipitation Type

- Particularly in mountainous terrain, real-time estimation of freezing level height and snow level are crucial to effective modeling of runoff

- Profiler and WSR-88D observations can provide physical evidence of level at which snow begins to melt, and lowest level at which precipitation remains frozen
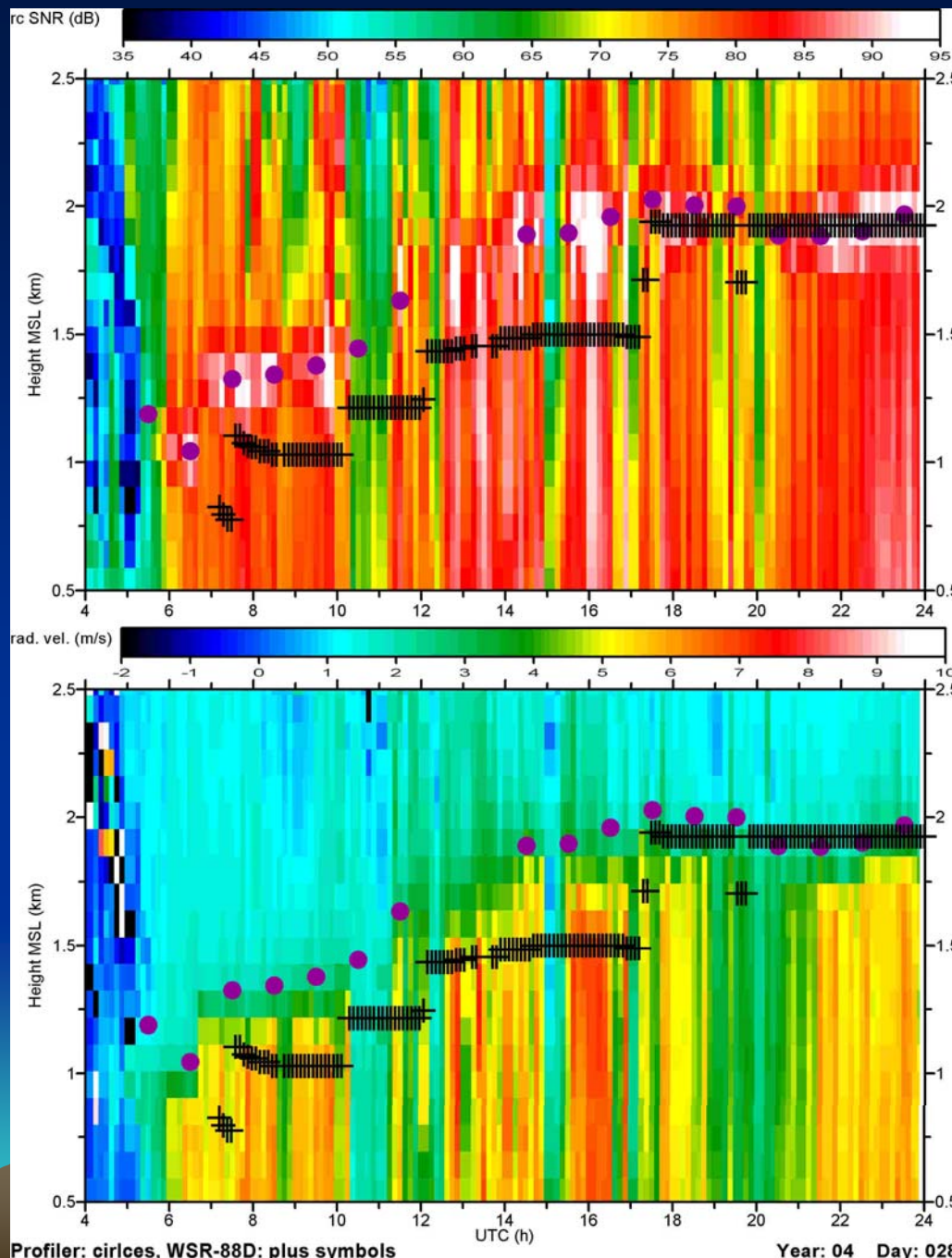
WSR-88D and Profiler Estimates of Freezing Level Height

Circles: Profiler
Crosses: WSR-88D

Upper figure: SNR

Lower figure: vertical velocity

Data from Astoria OR profiler and Portland OR WSR-88D

28 Jan 2004